

Remarks

Applicant has amended claim 8 to overcome the informality leading to its objection.

The Office Action rejected claims 1, 2, 4, 7, 8, and 10, asserting that the claims are unpatentable under 35 U.S.C 103(a) in light of U.S. Patent 4,816,078 to Schiweck in combination with all of the following viewed collectively: U.S. Patent 4,831,127 to Weibel (Weibel-1), U.S. 5,008,254 to Weibel (Weibel-2), Shibamura et al. *J. App. Glycosci.*, Vol. 46, pages 249-256 (Shibamura), and Gatzi et al. *Helv. Chim. Acta.* (1938), 21, 195-205 (Gatzi).

a. Shibamura

Applicant points out that Shibamura was published later than the international filing date of the present application (April 26, 1999), not to mention applicants' May 1, 1998 Japanese priority date. On the last page of Shibamura, it is described that Shibamura was accepted on May 26, 1999. Therefore, Shibamura could not have been published before April 26, 1999, and cannot be considered prior art. Because the rejection relies on the teachings of Shibamura to the purported obviousness, removal of that reference should cause the withdrawal of the rejection.

b. Schiweck

The present invention relates to a process for manufacturing L-arabinose from vegetable fibers by acid hydrolysis. The commonly used previous extraction of hemicellulose such as arabinan and arabinoxylan with an alkali such as $\text{Ca}(\text{OH})_2$ is eliminated, as demonstrated in the specification at pages 5 and 6.

Schiweck, however, discloses a process comprising commonly used previous extractions

of hemicellulose with an alkali. In claim 1 of Schiweck, step (a) is defined wherein the araban containing plant material is dissolved by adding $\text{Ca}(\text{OH})_2$. (See Examples 1-3 of Schiweck)

When vegetable fiber is treated with an alkali as in Schiweck, hemicellulose is extracted. The hemicellulose consists of various monosaccharides including L-arabinose. Thus, when the hemicellulose is treated with acid, many different monosaccharides including L-arabinose are liberated which leads to low purity of arabinose.

In contrast, in the process according to the present invention, vegetable fiber is directly treated with acid so as to selectively liberate L-arabinose, which is present at the non-reducing terminals of the vegetable fiber leading to increased purity of L-arabinose. (See the paragraph bridging from page 5 to page 6 of the present specification)

For example, in Example 1 of the present specification, 93% purity of L-arabinose (occupying rate of L-arabinose) is achieved. (See the top row of Table 1, page 17 of the present specification) Such high purity of L-arabinose is very advantageous especially when manufacturing L-arabinose commercially. Unfortunately, in examples 1, 2, and 3 of Schiweck, it is not clear how much the purity of L-arabinose was after acid hydrolysis with H_2SO_4 . However, in the "Background Art" section of the present specification, it is described that according to the method disclosed in Japanese Patent Laid-Open No. 312997/1997, purity of L-arabinose (the L-arabinose content in the monosaccharide) is calculated as low as 18.9%. Therefore, such a method is not practical. (See the paragraph bridging from page 3 to 4 of the present specification)

While the final purity of L-arabinose in Schiweck is 95% in Example 1, the yield is modest, making Schiweck's process unsuitable for commercial manufacture. In contrast, the present invention selectively targets L-arabinose during acid hydrolysis resulting in greater yield.

c. **Weibel-1**

The present invention relates to a process for producing relatively pure L-arabinose using acid hydrolysis of vegetable fibers. Acid hydrolysis is a reaction by which polysaccharides such as hemicellulose are degraded to become monosaccharides such as L-arabinose.

Weibel-1 discloses a method of manufacturing hemicellulose, a polysaccharide, using acid hydrolysis. The starting material and the type of treatment may be similar to those of the present invention, but the product by the disclosed process is hemicellulose. Degradation of hemicellulose will produce small amounts of L-arabinose as well as other monosaccharides as seen in Example 6, but Weibel-1 specifically seeks to avoid such degradation. Where such degradation occurred, in Example 6, a process of enzymatic digestion rather than acid hydrolysis was used. Therefore, Weibel-1 does not teach the production of pure L-arabinose on a large scale, but in effect teaches away from the hydrolysis of the hemicellulose that the present invention seeks to perform.

Weibel- 1, in claim 25, also adds the condition of mechanical shearing, which is performed after acidic hydrolysis of plant material, and is selected "substantially to disassociate said hemicellulose from said cellulose without causing substantial degradation of said hemicellulose." Weibel-1 discourages the process of degradation of hemicellulose to monosaccharide form.

d. Weibel-2

The disclosure of Weibel-2 is nearly identical to Weibel-1. Weibel-2 merely discloses

a

process for producing pectin. Pectin is a polysaccharide that is made up of several monosaccharides such as L-arabinose, D-galactose, and others bonded together in a condensation reaction. However, the mere fact that pectin may contain quantities of L-arabinose does little to show others in the art a method of producing relatively pure L-arabinose in pure form. Weibel-2 fails to teach a method of manufacturing L-arabinose via hydrolysis of pectin.

e. Gatzi et al.

Gatzi et al. teaches the catalytic hydrogenation of L-arabinose using Raney Ni and H₂ to produce L-arabitol. In contrast, the present invention couples hydrogenation of L-arabinose with the claimed method of manufacture of L-arabinose to create large quantities of L-arabitol. Gatzi et al. does not teach a similar method.

e. Conclusion

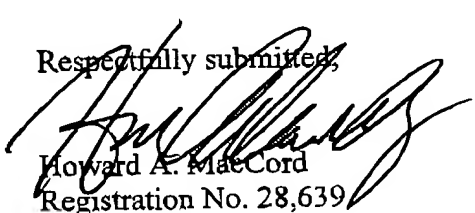
The references cited in the Office Action teach nothing that suggests combining them to create a method of manufacturing L-arabinose or L-arabitol. Weibel-1 and Weibel-2 seek to prevent degradation of hemicellulose, while Schiweck degrades such polysaccharides to obtain L-arabinose. Therefore, there is no reason that one skilled in the art would be motivated to combine the teachings of Schiweck, Weibel-1, and Weibel-2. Further, Gatzi et

al. teaches a method of hydrogenating L-arabinose to create L-arabitol. Nothing in Gatzi et al. suggests combining with the other references to produce large quantities of L-arabinose and hydrogenating to produce L-arabitol.

The Office Action further asserts that one skilled in the art would have been motivated to combine the teachings of the above references in order to increase the yield and purity of L-arabinose due to a long felt need in the industry for such a process. It is true that there has been a long felt need in the industry. However, failure to remedy the long felt need speaks for non-obviousness. It is therefore impermissible hindsight to conclude that these references suggest combining.

The Applicant submits that by this amendment he has placed the case in condition for immediate allowance and such action is respectfully requested. However, if any issue remains unresolved, Applicant's attorney would welcome the opportunity for a telephone interview to expedite allowance and issue.

Respectfully submitted,


Howard A. MacCord
Registration No. 28,639
MacCord Mason PLLC
P. O. Box 2974
Greensboro, NC 27402
(336) 273-4422

Date: July 7, 2003
File No.: 4629-007

CERTIFICATE OF TRANSMISSION

I HEREBY CERTIFY THAT THIS DOCUMENT IS
BEING FACSIMILE TRANSMITTED TO THE
PATENT AND TRADEMARK OFFICE (FAX NO.
(703) 305-3014) TO: EXAMINER Patrick D. Lewis,
ART UNIT 1623

ON July 7, 2003

(Date of Deposit)

Christian E. Carter

Name of Depositor


Signature

MacCord Mason

ATTORNEYS AT LAW

A Professional Limited Liability Company

EDWARD W. RILEE
HOWARD A. MacCORD, JR.
WILLIAM J. MASON
JAMES L. LESTER
GILBERT J. ANDIA, JR.
STANISLAV ANTOLIN
JAMES N. ROGERS‡
DEAN M. TURMAN*
‡not admitted in NC, admitted WV
*not admitted in NC, admitted FL
BEN D. FRINK
Registered Patent Agent

PATENTS, TRADEMARKS, COPYRIGHTS,
TRADE SECRETS, LICENSING,
AND UNFAIR TRADE PRACTICES

1600 FIRST UNION TOWER
300 NORTH GREENE STREET
POST OFFICE BOX 2974
GREENSBORO, NORTH CAROLINA 27402

www.maccordmason.com

FAX RECEIVED
JUL 08 2003
GROUP 1600

Greensboro Office:
(336) 273-4422
Fax: (336) 271-2830

Wilmington Office:
(910) 256-3557
Fax: (910) 256-0523

OFFICIAL

Original Will Follow Via:

- ☐ Mail
☐ Hand Delivery
☐ Without Enclosures

- ☐ Courier
☐ With Enclosures
☐ International Airmail

☒ Will Not Follow

TELEFAX COVER SHEET

TO:
Examiner Patrick T. Lewis

FROM:
Howard A. MacCord, Jr.

ORGANIZATION/FIRM:
U.S. PTO

DATE:
July 7, 2003

FAX NUMBER:
(703) 305-30144

RECIPIENT'S PHONE NUMBER:
(703) 305-4043

TOTAL # OF PAGES
(Including Cover): 9

YOUR E-MAIL ADDRESS:
amaccord@maccordmason.com

RE:
Amendment to April 8, 2003 Office Action in re: 09/674,242

NOTES/COMMENTS:

Please confirm receipt of fax.
Thank you.

Confidentiality Notice

The information contained in this fax transmittal is privileged and confidential, intended for the addressee only. If you are neither the intended recipient nor the employee or agent responsible for delivering this message to the intended recipient, any disclosure of this information in any way or taking of any action in reliance on this information is strictly prohibited. If you have received this fax in error, please notify the person transmitting the information immediately.

cc

Telefax Operator